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OPERATION OF CALIFORNIA PROFILOGRAPH AND EVALUATION OF PROFILES

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read **"SAFETY AND HEALTH"** in Part 4 of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

The operation of the California profilograph, the procedure used for determining the Profile Index from profilograms of pavements made with the profilograph, and the procedure used to locate individual high points in excess of 7.5 mm are described in Parts 1, 2, and 3, respectively, in this test method.

PART 1. USE OF THE CALIFORNIA PROFILOGRAPH

A. EQUIPMENT

The California profilograph consists of a frame 7.62 m in length supported upon wheels at either end. The profile is recorded from the vertical movement of a wheel attached to the frame at mid-point and is in reference to the mean elevation of the points of contact with the road surface established by the support wheels (see Figure 1). The profilogram is recorded on a scale of 1 mm equal to 300 mm longitudinally, and 1 mm equal to 1 mm, or full scale, vertically. Motive power may be provided manually or by the use of a propulsion unit powered with a gasoline engine attached to the center assembly.

B. OPERATION AND CALIBRATION OF THE PROFILOGRAPH

The instructions for assembling the profilograph are contained in a booklet accompanying each unit.

In operation, the profilograph should be moved at a speed no greater than a walk so as to eliminate as much bounce as possible. Too high a speed will result in a profilogram that is difficult to evaluate.

Calibration of the profilograph should be checked periodically. The horizontal scale can be checked by running a known distance and scaling the result on the profilogram. If the scale is off, the profile wheel should be changed to one of a proper diameter. The vertical scale is checked by putting a board of known thickness under the profile wheel, and again, scaling the result on the profilogram. If the scale is off, the cause of the incorrect height should be determined and corrected.

NOTE: Read the "Precautions" section in the instruction booklet prior to using the California profilograph.

PART 2. DETERMINATION OF THE PROFILE INDEX

A. EQUIPMENT

To determine the Profile Index, use a plastic scale 40 mm wide and 333.3 mm long representing a pavement length of 100 m or 0.1 km at a scale of 1:300. A plastic scale for the profilograph may be obtained by the districts from the Transportation Laboratory. Near the center of the scale is an opaque band 5 mm wide extending the entire length. On either side of this band are scribed lines 2 mm apart and parallel to the opaque band. These lines are used to measure deviations or

excursions of the graph above or below the blanking band. The deviations are called "scallops".

B. METHOD OF COUNTING

Place the plastic scale over the profile in such a way as to "blank out" as much of the profile as possible. When this is done, scallops above and below the blanking band usually will be approximately balanced. See Figure 2.

The profile trace will move from a generally horizontal position when going around super elevated curves making it impossible to blank out the central portion of the trace without shifting the scale. When such conditions occur, the profile should be broken into short sections and the blanking band repositioned on each section while counting, as shown in the upper part of Figure 3.

Starting at the right end of the scale, measure and total the height of all the scallops appearing both above and below the blanking band, measuring each scallop to the nearest 1 mm. Write this total on the profile sheet near the left end of the scale together with a small mark to align the scale when moving to the next section. Short portions of the profile line may be visible outside the blanking band, but unless they project 0.6 mm or more and extend longitudinally for 0.6 m (2 mm on the profilogram) or more, they are not included in the count. See Figure 3 for illustration of these special conditions.

When scallops occurring in the first 0.1 km are totaled, slide the scale to the left, aligning the right end of the scale with the small mark previously made, and proceed with the counting in the same manner. The last section counted may or may not be an even 0.1 km. If not, its length should be scaled and the counts proportioned to an equivalent 0.1 km section. For example, 9 counts in 0.07 km = 12.9 or 13 per 0.1 km.

The Profile Index is defined as "millimeters per 0.1 km in excess of the 5 mm blanking band," but is simply called the Profile Index.

C. LIMITATIONS OF COUNT IN 0.1 KM SECTIONS

When the specifications limit the amount of roughness in "any 0.1 km section", the scale is moved along the profile and counts made at various locations to find those sections if any, that do not conform to specifications. The limits are then noted on the profile

and can be later located on the pavement preparatory to grinding.

D. LIMITS OF COUNTS — JOINTS

When counting profiles, a day's paving is considered to include the last portion of the previous day's work, which includes the daily joint. The last 5 to 10 m of a day's paving cannot usually be obtained until the following day. In general, the paving contractor is responsible for the smoothness of joints if he places the concrete pavement on both sides of the joint. On the other hand, the contractor is responsible only for the pavement placed by him if the work abuts a bridge or a pavement placed under another contract. Profilograph readings, when approaching such joints, should be taken in conformance with current specifications.

PART 3. DETERMINATION OF HIGH POINTS IN EXCESS OF 7.5 MM

A. EQUIPMENT

Use a plastic template having a line 25 mm long scribed on one face with a small hole or scribed mark at either end, and a slot 7.5 mm from and parallel to the scribed line. See Figure 3. (The 25 mm line corresponds to a horizontal distance of 7.5 m on the pavement.) The plastic template may be obtained from Transportation Laboratory.

B. LOCATING HIGH POINTS IN EXCESS OF 7.5 MM

At each prominent peak or high point on the profile trace, place the template so that the small holes or scribe marks at each end of the scribed line intersect the profile trace to form a chord across the base of the peak or indicated bump. The line on the template need not be horizontal. With a sharp pencil draw a line using the narrow slot in the template as a guide. Any portion of the trace extending above this line will indicate the approximate length and height of the deviation in excess of 7.5 mm.

There may be instances where the distance between easily recognizable low points is less than 25 mm (corresponding to 7.5 m on the pavement). In such cases a shorter chord length shall be used in aligning the scribed line on the template tangent to the trace at the low points. It is the intent of this requirement that the baseline for measuring the height of bumps will be as near to 25 mm as possible, but in no case exceed this value. When the distance between prominent low

points is greater than 25 mm (corresponding to 7.5 m on the pavement), make the ends of the scribed line intersect the profile trace when the template is in a nearly horizontal position. Examples of the possible positions are shown in Figure 3.

PART 4. SAFETY AND HEALTH

Use leather gloves when assembling and storing the profilograph frame. Use proper lifting methods and be aware of pinch points and sharp edges.

Prior to handling gasoline, or operating equipment, operators are required to read Caltrans Laboratory Safety Manual Part A, Section 5.0, Hazards and Employee Exposure; Part B, Section 5.0, Safe Laboratory Practices; and Part C, Section 1.0, Safe Laboratory Practices and Section 2.0, Field Operations and Testing. Users of this method do so at their own risk.

End of Text (California Test 526 contains 6 Pages)

EXAMPLE SHOWING METHOD OF DERIVING PROFILE INDEX FROM PROFILOGRAMS

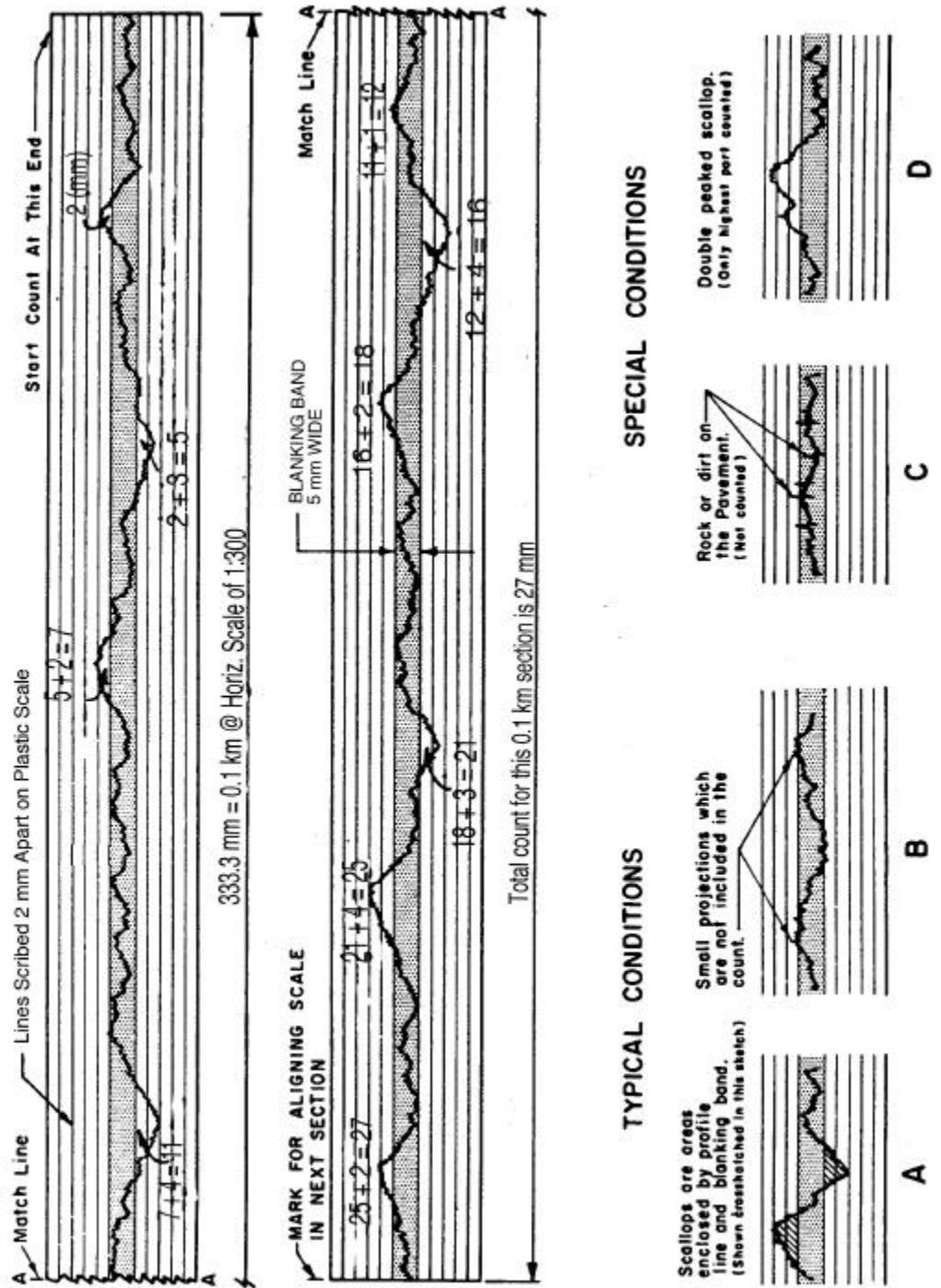
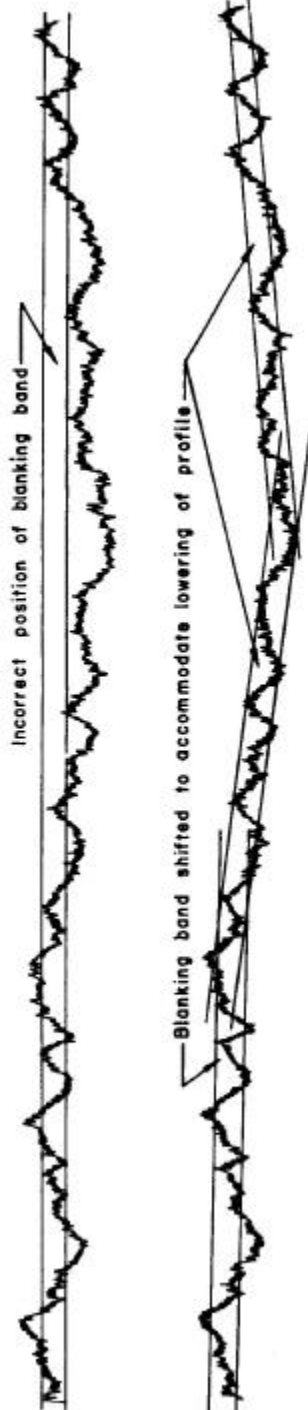


FIGURE 1

METHOD OF COUNTING WHEN POSITION OF PROFILE SHIFTS AS IT MAY WHEN ROUNDING SHORT RADIUS CURVES WITH SUPERELEVATION



METHOD OF PLACING TEMPLATE WHEN LOCATING BUMPS TO BE REDUCED

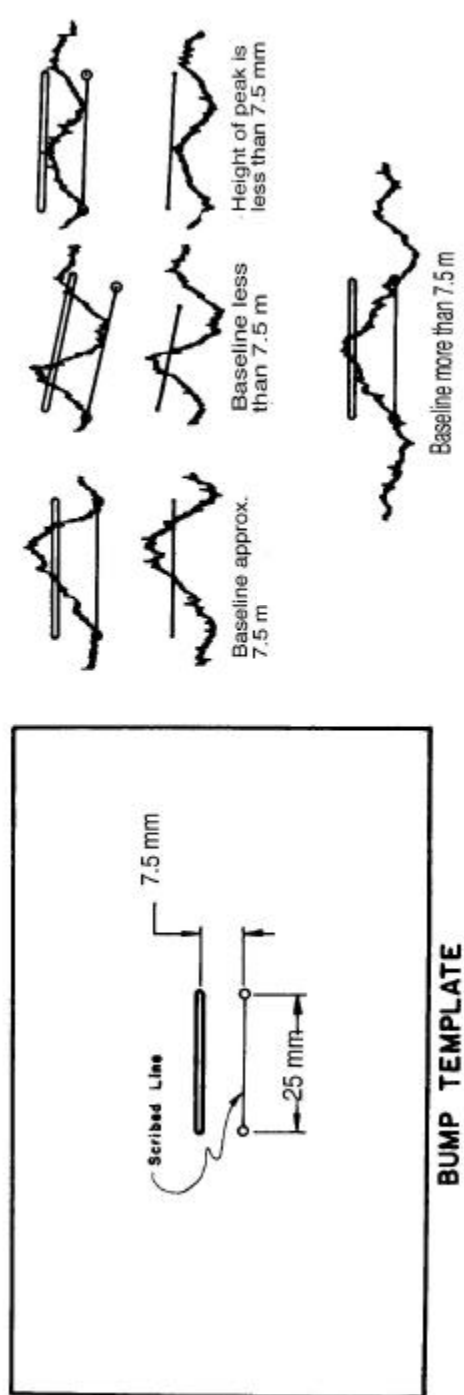


FIGURE 2

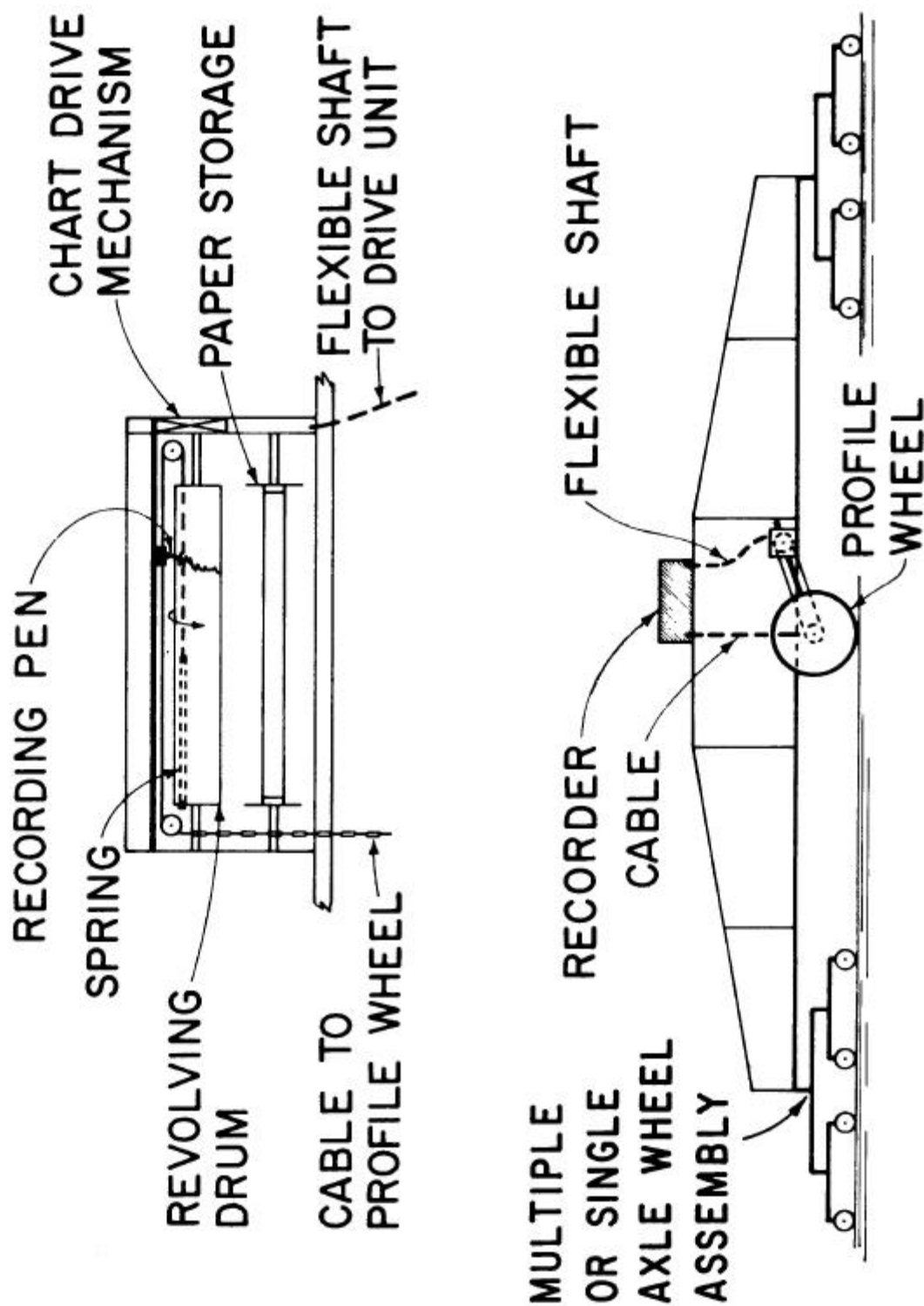


FIGURE 3